REMARKS

Enclosed is a request for an extension of time and the required fee.

The present invention addresses phosphor layer deterioration problems that may occur during the aging of plasma display panels and particularly problems that can occur to a blue phosphorous layer formed on the back plate and partitions resulting from the ion impact and ultraviolet irradiation that is generated by the discharge during the aging process.

As described, for example, on page 23 of our present specification, a preliminary heating process can be utilized to release the gas that had been absorbed during the manufacturing steps. Dry atmospheric gas can be circulated through the oven while the phosphorous layer is exposed at a pre-baking temperature of around 350°C. After a pre-baking step, the temperature can be raised, for example, to 400°C to further assure the release of the gas that has been absorbed. Subsequently a sealing process is disclosed as discussed on page 24 of our present specification wherein the back plate is pressed down onto the front plate so that the plates are sealed in a controlled manner. The plates can be sealed together while still hot, and moisture and the like are not readily absorbed by the plates after the end of the preliminary heating process to help prevent heat deterioration of the phosphorous layer. In this environment, an atmosphere of dry air is circulated so that any problems with steam and atmospheric gas will not occur.

Our present invention as defined in the presently pending claims is directed to an improvement in the subsequent aging process which occurs after the front and back plates have been sealed together. A structure for performing this aging process is shown, for example, in Figure 5 of our present application. As noted on page 35, the present inventors concluded that deterioration in the blue phosphorous layer during the aging process of a plasma display panel can be the result of deterioration caused by a gas including steam generated during the aging

process. Thus, as set forth in the presently pending claims, our aging process comprises an introducing process for introducing a discharge gas with a partial steam pressure of no more than 15 Torr and employing a subsequent evacuating process for evacuating the discharge gas from the inner space in the PDP with an interim discharge cycle when a required discharge voltage is applied to discharge electrodes during a plurality of discharge periods.

The introducing process of the discharge gas and the evacuating process occurs in intervals between the discharge periods, thereby enabling the discharge gas to be circulated through the inner space. As noted on page 36, line 25, through page 37, line 10, a series of steps of introducing and evacuating the discharge gas at intervals are performed, and a plurality of discharge periods take place intermittently with the discharge gas being replaced between these intervals.

As can be further appreciated, by circulating the gas intermittently during the aging process, the discharge is stabilized during the periods in which the discharge gas is not introduced, thereby permitting the aging process to proceed in a controlled manner and resulting in an even aging period. Additionally, it is also possible to use only one air vent to perform both the introduction and evacuation of the discharged gas.

The Office Action contended that the subject matter of Claims 117, 118, 120, 122-125, 128 and 130 was rejected as anticipated by the *Inoue et al.*, U.S. Patent No. 6,236,159.

Additionally Claims 111 through 130 were also rejected over the *Inoue et al.* reference in view of the *Yamamoto et al.*, U.S. Patent No. 5,998,924, the *Todd*, U.S. Patent No. 3,981,554, and the *MacNair*, U.S. Patent No. 3,492,598.

The *Inoue et al.* reference is primarily concerned with providing a number of different configurations of gas flow barriers and a peripheral space on the panel to increase the gas flow

within the inner-rib spaces. In this regard, various forms of cleaning electrodes are taught so that impurity gases can be initially cleaned from the display panel in a cleaning process.

After evacuation of the display panel in the cleaning process, the display panel is then cooled to room temperature and a discharge gas is introduced into the panel to finish the production. The *Inoue et al.* reference was particularly directed to providing a panel that can be evacuated even at a low temperature and can be processed in a relatively shortened time period. See column 8, lines 34-41. The *Inoue et al.* reference then goes forward to disclose ten different embodiments of different configuration of barrier ribs. The *Inoue et al.* reference then proceeds to discuss various forms of evacuation and gas introduction starting on column 13, line 31.

Inoue et al. does not define a particular temperature to heat an oven in performing the evacuation or cleaning process. Rather *Inoue et al.* simply described a "predetermined temperature in which impurity gases absorbed on the barrier ribs and the like and the PDP can be released there from." See column 14, lines 13-16.

During the cleaning gas procedure, the plasma display panel is maintained within an oven and a cleaning gas valve is closed, and the oven is then brought to room temperature preparatory for introduction of the discharge gas.

A Fourth evacuation and gas introduction process is disclosed for the apparatus of Figure 21 wherein a discharger 44 applies a voltage to cause the impurity gases absorbed on the surface of the protective layer to be released. Thus the cleaning process includes an electric discharge as set forth in column 16, lines 13-19.

In a Fifth evacuation and gas introduction process, a specific procedure is disclosed on column 16, lined 55-67, where the cleaning gas inlet valve is repeatedly opened and closed at particular temperatures below "the predetermined impurity gas releasable temperature." When

the cleaning gas inlet valve is open, an electric discharge is caused in the plasma display panel by the discharger 44.

The *Inoue et al.* reference does not address an aging process.

Our present claims are directed to a process to improve and prevent the deterioration of the phosphorous layer and more particularly blue phosphorous. As such, the plasma display panel has been preliminarily cleaned and has been appropriately formed so that the front and back plates are sealed together. A required discharge voltage is then applied with a discharge gas introduced into the inner space and having a partial steam pressure of no more than 15 Torr. The gas introduction process and the gas evacuating process occur in intervals between discharge periods. *Inoue et al.* teaches discharging, not for an aging process, but rather during the initial cleaning step, and the most analogous description relates to the Fifth evacuation and gas introduction process where the cleaning gas is introduced in intervals and an electric discharge from the discharger 44 occurs when the cleaning gas inlet valve is opened.

The *Todd* reference is directed to a procedure for repairing defective cathode ray tubes and more particularly for attaching a weight to a stem of a cathode ray tube and then providing a circumferential crack between the stem and a funnel portion. The base of the tube, surrounding the crack is sealed, and a vacuum is applied so that the pressure within the tube will cause the crack to expand and release the lower part of the stem. The separated stem with the weight attached thereto, will then trip a switch within the hermetic chamber which terminates the evacuation and enables the admission of a noncontaminating gaseous atmosphere into the hermetic chamber. See column 3, lines 3-14. Needless to say, this reference does not teach nor suggest the present invention nor does it address the issues involved with the deterioration of phosphorous in a plasma display panel. The Office Action acknowledges that the reason for the

Todd reference was simply for its teaching in column 4 that a contaminating gas can include gas in a form of water vapor.

Likewise, the *Yamamoto et al.*, U.S. Patent No. 5,998,924, was cited for its teaching that moisture can also be a contaminating factor in an emissive type display. Again, this is not a teaching that is applicable to a plasma display. (See column 1, lines 21-26.) This reference seeks a balance of a physical adsorption of carbon into a carbonaceous film during the deterioration or degradation that occurs with either evaporation or sputtering. In this regard, the mean adsorption time should be less than the period of the pulse voltage that is applied to the electronic emitting device. Again, it is believed that this reference is simply cited for disclosing that it is not desirable to have moisture in such an environment since it has "a relatively long mean adsorption time."

The *MacNair*, U.S. Patent No. 3,492,598, teaches manufacturing a gas discharge device having a cathode member with an alkaline earth carbonate emissive coating. The *MacNair* reference is directed to a laser device that is to operate in a non-oxidizing inert gaseous environment. *MacNair* teaches specifically the flowing of an inert gas at atmospheric pressure and specifically heating a cathode member to approximately 900°C with a subsequent flash heating at 950°C to convert the alkaline earth carbonates into an emissive coating on a screen to a desired oxide level. Neither *Todd*, *Yamamoto* or the *MacNair* reference would suggest a feature that would be incorporated by a person skilled in the plasma display field into the *Inoue et al.* reference. *Inoue et al.* was seeking a short economical production method for a plasma display panel with a preliminary heating procedure at a low temperature. None of these references suggest an aging process for a plasma display panel of the present invention nor do

they disclose any teaching that would be applicable for incorporation into the *Inoue et al.* reference.

At most, one embodiment in the gas cleaning procedure of the *Inoue* reference suggests that a discharge gas is introduced into the electric discharge space and an electric discharge occurs during introduction of the gas. *Inoue et al.*, *Yamamoto* and the *Todd* reference do not disclose that a discharge is produced while the discharge gas is circulated intermittently through an inner space during an aging process. These features are set forth in the newly drafted Claim 131 were also previously set forth in the pending Claim 112.

The Office Action also cited the *Itoh et al.*, U.S. Patent No. 5,564,958, for combination with the *Yamamoto et al*, *Todd* and *MacNair* references. The Office Action contended that gas cleaning would be recognized to be the same as an aging process when an electric discharge is produced with ionized gas molecules bombarding a cathode to knock loose gas impurities therefrom. *Itoh et al.* describes such a procedure as a gas cleaning procedure and specifically uses a reduction gas oxidizing a display device to thereby be reduced. Figure 2 discloses the temperature profile in this arrangement. The display device is heated to a temperature of 350°C for a period of thirty minutes, and during this thirty minute period, a reducing gas is introduced and evacuated repetitively. Subsequently the temperature is lowered to 300° and maintained for over six hours before the tube is then sealed. Figure 5b discloses the effects of the gas cleaning so that a spectrum of metal molybdenum has increased its intensity while the molybdenum oxides have a reduced intensity. Thus oxidation has been limited by a specific gas cleaning procedure.

The Office Action cited specifically the second embodiment shown in Figure 4 wherein the display is energized for a few to several minutes while carrying out the gas evacuation of the

display device. *Itoh et al.* does not teach the partial water vapor as set forth in our present invention, nor does it teach an aging step with gas introduction and evacuation between the discharging. *Itoh et al.* also suggested a field emission cathode to introduce gas such as methane gas to permit adhesion of carbon to decrease a work function. Additionally, the introduction of electricity with a cathode for merely a few minutes was part of the gas cleaning procedure, and after the gas cleaning, there was still an evacuation procedure carried out for six hours prior to sealing. *Itoh et al.* does not address an aging process to restore the luministic characteristics of blue phosphor.

> Measuring a claimed invention against the standard established by section 103 requires the oft-difficult but critical step of casting the mind back to the time of invention, to consider the thinking of one of ordinary skill in the art, guided only by the prior art references and the then-accepted wisdom in the field. See, e.g., W.L. Gore & Assoc., Inc. v. Garlock, Inc., 721 F.2d 1540, 1553, 220 UPSQ 303, 313 (Fed.Cir. 1983). Close adherence to this methodology is especially important in the case of less technologically complex inventions, where the very ease with which the invention can be understood may prompt one "to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher." Id..
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> = *In re Anita Dembiczak,* 50 U.S.PQ. 2d (Fed. Cir. 1999) 1614, 1617.

In summary, applicant appreciates the Examiner's detailed comments in the Office Action although applicant respectfully traverses the conclusions. Applicant points out that even with a combination of four references, the Office Action still must make assumptions as to what would be known to a person of ordinary skill in this field since there is neither a teaching reference nor are all of the elements of our claims found in any combination of the cited teachings.

The Examiner is aware that this is a highly competitive field with numerous skilled engineers and scientists working to improve the performance of plasma display panels. In such

an environment, it is respectfully submitted that our claims as now set forth, more than adequately define a patentable invention, and a notification of allowance is sought.

If the Examiner believes that a telephone interview will help further the prosecution of this case, he is respectfully requested to contact the undersigned attorney at the listed telephone number.

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on May 6, 2003.

By: James Lee

Signature

Dated: May 6, 2003

Very truly yours,

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